



RN-7349

B. E. - IV (Sem. VII) (Civil) Examination

May / June - 2010

Structural Design & Drawing - III

Time : 4 Hours]

[Total Marks : 100

Instructions :

(1)

नीचे दृश्यादिब निशानीवाणी विगतो उत्तरवडी पर अवश्य बपवी.
 Fillup strictly the details of signs on your answer book.

Name of the Examination :
B. E. - 4 (Sem. 7) (Civil)

Name of the Subject :
Structural Design & Drawing-3

Subject Code No. : **7 3 4 9** Section No. (1, 2,.....) : **1&2**

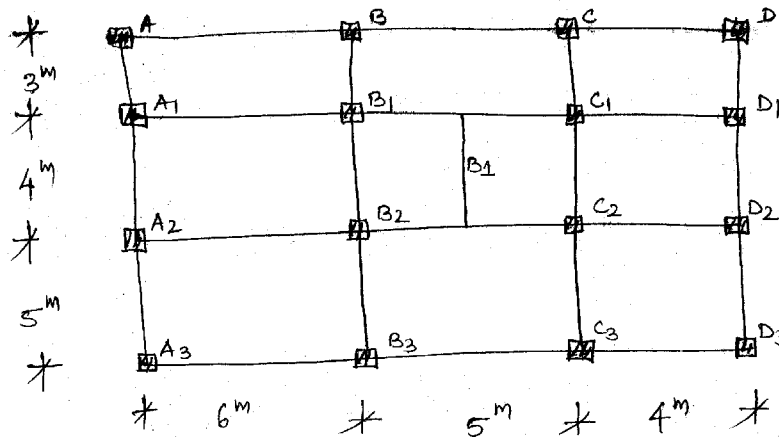
Seat No. :

Student's Signature

- (2) Use of relevant I.S. code is permitted and use of interaction charts SP:16 is permitted.
- (3) Assume suitable data wherever necessary and state the same clearly.
- (4) Consider M20 concrete and Fe-415 steel if not specified.
- (5) Marks are indicated at the right of each question.

SECTION - I

- 1 Design beam $A_2B_2C_2D_2$ for following figure 1 of plan of multistoried building. 15
 Also design the column 'A₂' considering the multistoried building as G+5. 10



- All internal wall thickness 115 mm and external wall thickness 230 mm
 - All beam having size 230 mm × 560 mm
 - All column size 230 mm × 420 mm
 - Adopt slab thickness = 120 mm
 - Assume M_{20} - Fe415
 - $LL = 1.5 \text{ kN/m}^2$ and $FF = 0.8 \text{ kN/m}^2$
- 2 Write the advantages of prestressed concrete over simple RCC. Also explain the basic concept of prestressed concrete. 10
- OR**
- 2 Explain load balancing concept in detail with sketches. 10
- 3 Design a combined trapezoidal footing for two columns A and B spaced 5m c/c. Column A is 300 mm × 300 mm in size and transmits a load of 600 kN. Column B is 400 mm × 400 mm in size and carries a load of 900 kN. The maximum length of footing is restricted to 7 metres only. SBC of soil is 120 kN/m². Use M_{20} - Fe415. 15
- OR**
- 3 Two reinforced concrete columns 400 mm × 400mm in section. Carry a load of 1000 kN, each inclusive of self wt. Design a combined footing having central beam joining the columns. The centre to centre spacing of the columns is 4 metres. SBC of soil is 150 N/mm². Use M_{20} Fe415. 15

SECTION - II

- 4 A short R.C.C. column is to carry a factored load of 1900 kN. If the column is to be a square, design the column. Assume $e_{\min} < 0.05 D$. The materials are M_{20} grade concrete and mild steel. 10
- OR**
- 4 A rectangular beam section of size 230 mm width × 400 mm overall depth, is reinforced with 2 no 10 mm diameter bars at the top and 3 no. 16 mm diameter bars at bottom being tension reinforcement. It is subjected to characteristics loads, shear force of 16 kN, a torsional moment of 1.3 kN-m and bending moment of 17 kN-m. Check for the torsion reinforcement. The materials are M_{20} grade concrete and HYSD reinforcement of grade Fe415. 10

- 5 A cantilever retaining wall to retain the earth 3.8 m high. 25
 The top surface is horizontal behind the wall but subjected to a surcharge of 17 kN/m^2 . The soil behind the wall is a well drained medium dense sand with following properties.
 Unit weight $\gamma = 17 \text{ kN/m}^3$

Angle of internal friction $\phi = 30^\circ$.

The material under the wall base is the same as above with safe bearing capacity of 150 kN/m^2 . The coefficient of friction between base and soil is 0.55, design the wall upto stem only using M_{20} grade concrete and HYSD reinforcement of grade Fe-415.

- 6 For an intz tank containers shown in Fig. 2. 15
 Design (a) Top dome (b) Top ring beam B_1 (c) Cylindrical wall.

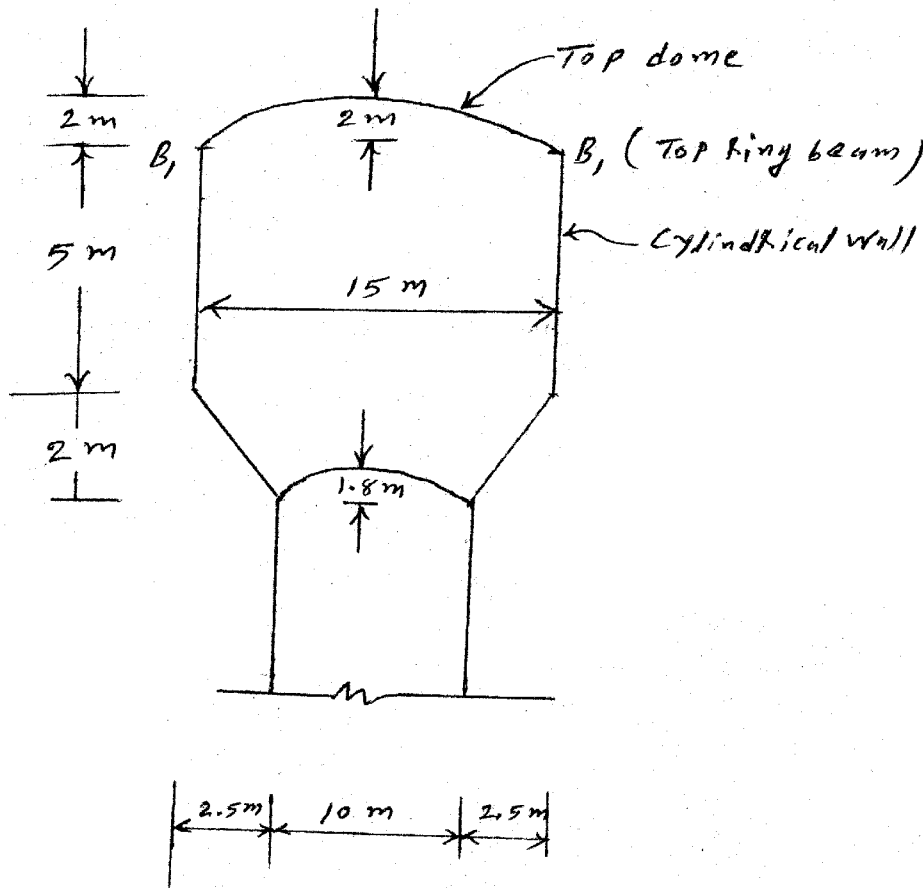


Fig. 2

Give neat sketches of above components with reinforcement details.